

CLAIMS

What is claimed is:

1. In a data broadcast system comprising one or more streams for broadcasting data to client systems, wherein the data broadcast system broadcasts a variety of data at particular times in order to meet demand for the variety of data at the client systems, a method of generating a data stream of a specified bandwidth for broadcast to one or more client systems, the method comprising acts of:

storing an identifier for at least one data source, the identifier indicating where data to be included within the data stream may be obtained;

for each identifier, storing scheduling information that comprises a time when the data from the at least one data source should be added to the data stream for broadcast to the one or more client systems;

requesting and receiving the data from the at least one data source; and

at the time specified in the scheduling information, adding the data obtained from the at least one data source to the data stream, whereby the data arrives at the one or more client systems in accordance with the scheduling information.

2. A method as recited in claim 1, wherein the data stream comprises a plurality of sub-streams, the method further comprising acts of:

storing a plurality of identifiers for a plurality of data sources;

for each identifier, storing scheduling information that comprises a time when the data from each of the plurality of sources should be added to the data stream for broadcast to the one or more client systems, wherein the scheduling information indicates that data from at least two of the data sources should be added to the data stream for simultaneous broadcast to the one or more client systems;

requesting and receiving the data from the at least two data sources; and

at the time specified in the scheduling information, adding the data obtained from the at least two data sources to distinct sub-streams within the data stream, whereby the data from the at least two data sources arrives at the one or more client systems simultaneously.

3. A method as recited in claim 2, wherein at least one of the plurality of sub-streams is dedicated to broadcasting data in real time.

4. A method as recited in claim 2, wherein the data broadcast system further comprises (i) a scheduled content service for storing the plurality of identifiers and for storing scheduling information for each identifier, and (ii) a data broadcast service for requesting and receiving data from the data sources and for adding the data obtained from the data sources to the data stream.

5. A method as recited in claim 1, wherein the scheduling information further comprises at least one of (i) a time to begin broadcast of the data, (ii) a retransmission frequency to increase the probability that static data is received by the one or more client systems, (iii) a refresh frequency to assure that dynamic data is updated at the one or more client systems, (iv) a time when a final broadcast of the data should end, (v) meta-data associated with the data, (vi) a bandwidth allocation for the data, and (vii) data size information for static data.

6. A method as recited in claim 1, wherein each of the one or more clients is running one or more applications, and wherein the broadcast data stream provides the data for each of the one or more applications to consume.

7. A method as recited in claim 1, further comprising an act of checking any previously existing scheduling information to verify that bandwidth is available in the data stream prior to storing the scheduling information.

8. A method as recited in claim 1, wherein the data is of a known size, the method further comprising an act of calculating at least one of (i) a recommended bandwidth for a specified refresh or retransmission frequency, and (ii) a recommended refresh or retransmission frequency for a specified bandwidth.

9. A method as recited in claim 1, wherein the identifier for the at least one data source is a uniform resource identifier or uniform resource locator.

10. A method as recited in claim 1, wherein the data comprises one or more files and the scheduling information further comprises meta-data associated with each of the one or more files, the meta-data comprising at least one of (i) an expiration time after which the one or more clients may delete a file, (ii) an extension time for extending the expiration time of a file that already exists, (iii) one or more allowed update flags if a file represents a directory, (iv) a trigger for causing some action to be performed at a client system, (v) one or more expressions for specifying one or more conditions that are associated with a file.

11. A method as recited in claim 10, further comprising the act of adding the meta-data to the data stream.

12. A method as recited in claim 1, further comprising an act of delivering the data stream to a broadcaster for broadcast to the one or more client systems.

13. In a data broadcast system comprising one or more streams for broadcasting data to client systems, wherein the data broadcast system broadcasts a variety of data at particular times in order to meet demand for the variety of data at the client systems, a method of generating a data stream of a specified bandwidth for broadcast to one or more client systems, the method comprising steps for:

identifying at least one data source where data to be included within the data stream may be obtained;

scheduling a time when data from each identified data source should be added to the data stream for broadcast to the one or more client systems, the scheduled time being a part of scheduling information for the data to be included within the data stream;

obtaining the data from the at least one data source; and

at the time specified in the scheduling information, generating the data stream with the data obtained from the at least one data source, whereby the data arrives at the one or more client systems in accordance with the scheduling information.

14. A method as recited in claim 13, wherein the data stream comprises a plurality of sub-streams, the method further comprising steps for:

identifying a plurality of data sources where data to be included within the data stream may be obtained;

scheduling a time when data from each identified data source should be added to the data stream for broadcast to the one or more client systems, wherein data from at least two of the plurality of data sources is scheduled to be added to the broadcast data stream simultaneously;

obtaining the data from the at least two data sources; and

at the time specified in the scheduling information, generating the data stream that comprises at least two distinct sub-streams with the data obtained from the at least two data sources, whereby the data from the at least two data sources arrives at the one or more client systems simultaneously.

15. A method as recited in claim 14, wherein at least one of the plurality of sub-streams is dedicated to broadcasting data in real time.

16. A method as recited in claim 13, wherein the scheduling information further comprises at least one of (i) a time to begin broadcast of the data, (ii) a retransmission frequency to increase the probability that static data is received by the one or more client systems, (iii) a refresh frequency to assure that dynamic data is updated at the one or more client systems, (iv) a time when a final broadcast of the data should end, (v) meta-data associated with the data, (vi) a bandwidth allocation for the data, and (vii) data size information for static data.

17. A method as recited in claim 13, further comprising a step for determining, based on any previously existing scheduling information and prior to scheduling a time when data from each identified data source should be added to the data stream, whether or not bandwidth is available in the data stream.

18. A method as recited in claim 13, wherein the data is of a known size, the method further comprising a step for recommending (i) a bandwidth for a specified refresh or retransmission frequency, and (ii) a refresh or retransmission frequency for a specified bandwidth.

19. A method as recited in claim 13, wherein the data comprises one or more files and the scheduling information further comprises meta-data associated with each of the one or more files, the meta-data comprising at least one of (i) an expiration time after which the one or more clients may delete a file, (ii) an extension time for extending the expiration time of a file that already exists, (iii) one or more allowed update flags if a file represents a directory, (iv) a trigger for causing some action to be performed at a client system, (v) one or more expressions for specifying one or more conditions that are associated with a file, and wherein the method further comprises a step for including the meta-data in the generated data stream.

20. A computer program product for implementing, in a data broadcast system comprising one or more streams for broadcasting data to client systems, wherein the data broadcast system broadcasts a variety of data at particular times in order to meet demand for the variety of data at the client systems, a method of generating a data stream of a specified bandwidth for broadcast to one or more client systems, the computer program product comprising:

a computer readable medium for carrying machine-executable instructions that implement the method, wherein the method comprises acts of:

storing an identifier for at least one data source, the identifier indicating where data to be included within the data stream may be obtained;

for each identifier, storing scheduling information that comprises a time when the data from the at least one data source should be added to the data stream for broadcast to the one or more client systems;

requesting and receiving the data from the at least one data source; and

at the time specified in the scheduling information, adding the data obtained from the at least one data source to the data stream, whereby the data arrives at the one or more client systems in accordance with the scheduling information.

21. A computer program product as recited in claim 20, wherein the data stream comprises a plurality of sub-streams, the method further comprising acts of:

storing a plurality of identifiers for a plurality of data sources;

for each identifier, storing scheduling information that comprises a time when the data from each of the plurality of sources should be added to the data stream for broadcast to the one or more client systems, wherein the scheduling information indicates that data from at least two of the data sources should be added to the data stream for simultaneous broadcast to the one or more client systems;

requesting and receiving the data from the at least two data sources; and

at the time specified in the scheduling information, adding the data obtained from the at least two data sources to distinct sub-streams within the data stream, whereby the data from the at least two data sources arrives at the one or more client systems simultaneously.

22. A computer program product as recited in claim 21, wherein at least one of the plurality of sub-streams is dedicated to broadcasting data in real time.

23. A computer program product as recited in claim 21, wherein the data broadcast system further comprises (i) a scheduled content service for storing the plurality of identifiers and for storing scheduling information for each identifier, and (ii) a data broadcast service for requesting and receiving data from the data sources and for adding the data obtained from the data sources to the data stream.

24. A computer program product as recited in claim 20, wherein the scheduling information further comprises at least one of (i) a time to begin broadcast of the data, (ii) a retransmission frequency to increase the probability that static data is received by the one or more client systems, (iii) a refresh frequency to assure that dynamic data is updated at the one or more client systems, (iv) a time when a final broadcast of the data should end, (v) meta-data associated with the data, (vi) a bandwidth allocation for the data, and (vii) data size information for static data.

25. A computer program product as recited in claim 20, wherein each of the one or more clients is running one or more applications, and wherein the broadcast data stream provides the data for each of the one or more applications to consume.

26. A computer program product as recited in claim 20, the method further comprising an act of checking any previously existing scheduling information to verify that bandwidth is available in the data stream prior to storing the scheduling information.

27. A computer program product as recited in claim 20, wherein the data is of a known size, the method further comprising an act of calculating at least one of (i) a recommended bandwidth for a specified refresh or retransmission frequency, and (ii) a recommended refresh or retransmission frequency for a specified bandwidth.

28. A computer program product as recited in claim 20, wherein the identifier for the at least one data source is a uniform resource identifier or uniform resource locator.

29. A computer program product as recited in claim 20, wherein the data comprises one or more files and the scheduling information further comprises meta-data associated with each of the one or more files, the meta-data comprising at least one of (i) an expiration time after which the one or more clients may delete a file, (ii) an extension time for extending the expiration time of a file that already exists, (iii) one or more allowed update flags if a file represents a directory, (iv) a trigger for causing some action to be performed at a client system, (v) one or more expressions for specifying one or more conditions that are associated with a file, and wherein the method further comprises the act of adding the meta-data to the data stream.

30. A computer program product as recited in claim 20, further comprising an act of delivering the data stream to a broadcaster for broadcast to the one or more client systems.

31. A computer program product for implementing, in a data broadcast system comprising one or more streams for broadcasting data to client systems, wherein the data broadcast system broadcasts a variety of data at particular times in order to meet demand for the variety of data at the client systems, a method of generating a data stream of a specified bandwidth for broadcast to one or more client systems, the computer program product comprising:

a computer readable medium for carrying machine-executable instructions that implement the method, wherein the method comprises steps for:

identifying at least one data source where data to be included within the data stream may be obtained;

scheduling a time when data from each identified data source should be added to the data stream for broadcast to the one or more client systems, the scheduled time being a part of scheduling information for the data to be included within the data stream;

obtaining the data from the at least one data source; and

at the time specified in the scheduling information, generating the data stream with the data obtained from the at least one data source, whereby the data arrives at the one or more client systems in accordance with the scheduling information.

32. A computer program product as recited in claim 31, wherein the data stream comprises a plurality of sub-streams, the method further comprising steps for:

identifying a plurality of data sources where data to be included within the data stream may be obtained;

scheduling a time when data from each identified data source should be added to the data stream for broadcast to the one or more client systems, wherein data from at least two of the plurality of data sources is scheduled to be added to the broadcast data stream simultaneously;

obtaining the data from the at least two data sources; and

at the time specified in the scheduling information, generating the data stream that comprises at least two distinct sub-streams with the data obtained from the at least two data sources, whereby the data from the at least two data sources arrives at the one or more client systems simultaneously.

33. A computer program product as recited in claim 32, wherein at least one of the plurality of sub-streams is dedicated to broadcasting data in real time.

34. A computer program product as recited in claim 31, wherein the scheduling information further comprises at least one of (i) a time to begin broadcast of the data, (ii) a retransmission frequency to increase the probability that static data is received by the one or more client systems, (iii) a refresh frequency to assure that dynamic data is updated at the one or more client systems, (iv) a time when a final broadcast of the data should end, (v) meta-data associated with the data, (vi) a bandwidth allocation for the data, and (vii) data size information for static data.

35. A computer program product as recited in claim 31, the method further comprising a step for determining, based on any previously existing scheduling information and prior to scheduling a time when data from each identified data source should be added to the data stream, whether or not bandwidth is available in the data stream.

36. A computer program product as recited in claim 31, wherein the data is of a known size, the method further comprising a step for recommending (i) a bandwidth for a specified refresh or retransmission frequency, and (ii) a refresh or retransmission frequency for a specified bandwidth.

37. A computer program product as recited in claim 31, wherein the data comprises one or more files and the scheduling information further comprises meta-data associated with each of the one or more files, the meta-data comprising at least one of (i) an expiration time after which the one or more clients may delete a file, (ii) an extension time for extending the expiration time of a file that already exists, (iii) one or more allowed update flags if a file represents a directory, (iv) a trigger for causing some action to be performed at a client system, (v) one or more expressions for specifying one or more conditions that are associated with a file, and wherein the method further comprises a step for including the meta-data in the generated data stream.